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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/525,689	08/24/2005	Bruce F. Monzyk	BATZ 2 00001-3(II)-3 US	7655

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EXAMINER	
DINH, BACH T	

ART UNIT	PAPER NUMBER
1795	

MAIL DATE	DELIVERY MODE
01/30/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/525,689	MONZYK ET AL.	
	Examiner	Art Unit	
	BACH T. DINH	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 October 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-33 and 35-43* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-33 and 35-43* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Summary

1. This is the response to the communication filed on 10/09/2008.

2. Claims 1-33 and 35-43 remain pending in the application.

3. The amendment did not place the application in condition for allowance.

Double Patenting

4. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

5. Claims 1-15, 33 and 39-43 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-13 of U.S. Patent No. 6,866,755 in view of Gratzel et al. (WO 01/02624) with further evidence provided by Murdoch et al. (US 5,362,373). The claims of application '755 are silent regarding the cathode having the ability to convert carbon dioxide, electrons and hydrogen ions into a solid or liquid medium. In a photolytic cell,

water is cleaved into oxygen and hydrogen; wherein, oxygen is generated at the anode and hydrogen is generated at the cathode.

Gratzel discloses a photolytic cell for cleaving water into oxygen and hydrogen; wherein, the oxygen is generated at the anode and hydrogen is generated at the cathode (figure 1). The photolytic cell of Gratzel comprises the TiO_2 photocatalytic material as that of application '755 (page 2 lines 10-14). Furthermore, Gratzel discloses the cathode, that generates hydrogen from electron and hydrogen ions (page 4 lines 1-6), is made of Ni, Pt, Pd, Ru, Rh and Ir (page 9 lines 7-9), which are the same materials as those of current application (page 56 lines 26-28 of originally filed specification).

Murdoch discloses carbon dioxide reacts with hydrogen in the presence of noble metal catalyst, which includes platinum, palladium and ruthenium, to form methane and water (4:20-23); therefore, the noble metal cathode of Gratzel has the ability to convert carbon dioxide, hydrogen ions and electrons into a solid or liquid medium.

At the time of the invention, one with ordinary skill in the art would have found it obvious to modify the photolytic cell of application '755 with the cathode materials of Gratzel because the cathode materials of Gratzel are effective at generating hydrogen from electrons and hydrogen ions (Gratzel, page 4 lines 1-6). Furthermore, one would have expected success when using the known noble metal materials of Gratzel for the cathode of the known photolytic cell of application '755. Rationale D of *KSR*, MPEP 2141.

6. Claims 1-33 and 35-43 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-32 of copending

Application No. 10/485,934. Although the conflicting claims are not identical, they are not patentably distinct from each other because both the copending application and current claims recite the photolytic apparatuses with equivalent structures.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. Claims 1-14, 33 and 39-43 are rejected under 35 U.S.C. 102(b) as being anticipated by Nozik (US 4,011,149) with further evidence provided by Murdoch et al. (US 5,362,373) and Nieda et al. (US 2003/0076028).

Addressing claims 1-3, Nozik discloses a photolytic apparatus comprising:

A photolytic cell (figure 3) having an anode compartment containing, in sequence, a transparent window or waveguide (glass top 31), an anode (electrical conductor 32), a photo-reactive surface (electrode 33 made of TiO_2, 7:67-8:2) having the ability to convert water to oxygen (7:60-64), and an anolyte flowpath (6:65-68, liquid electrolyte flow through the cell and in contact with layer 33); and a cathode compartment with a cathode (counter electrode 34 made of platinum, 9:15-16) having the ability to convert carbon dioxide, electrons, and hydrogen ions into a solid or liquid

medium (6:36-39, the hydrogen ions react with the electrons at the counter-electrode to form hydrogen; Murdoch discloses carbon dioxide reacts with hydrogen in the presence of noble metal catalyst, which includes platinum, to form methane and water, 4:20-23; therefore, the platinum counter-electrode of Nozik has the ability to convert carbon dioxide, hydrogen ions and electrons into a solid or liquid medium); and

A light source (solar radiation 17, 1:7-10) for providing light photons to the photolytic cell and activating the photo-reactive surface (3:14-27);

Addressing claims 4 and 41-42, Nozik discloses the light source is solar radiation (1:7-10), which includes the claimed ultraviolet light and visible light of current claims.

Addressing claims 5-6, Nozik discloses the titanium oxide layer 33, when photolytically irradiated, converts water to hydrogen ions and electrons (6:30-33) and Nieda further shows that TiO_2 when irradiated also converts water to hydrogen peroxide (Nieda, [0040]).

Addressing claim 7, Nozik discloses the electrons are conducted from the anode to the cathode (6:30-33).

Addressing claims 8-9, where the recited disproportionation catalyst is not claimed as part of the structure of the claimed apparatus, the manner or method in which such

apparatus is to be utilized is not germane to the issue of patentability of the apparatus itself.

Addressing claims 10 and 33, the subject matter of current claims refers to the process in which carbon dioxide and hydrogen ion are converted, which is not claimed as part of the structure of the claimed apparatus. Therefore, the manner or method in which carbon dioxide and hydrogen ion are converted is not germane to the issue of patentability of the apparatus itself.

Addressing claims 11-12, where the recited substrate is not claimed as part of the structure of the claimed apparatus, the manner or method in which such apparatus is to be utilized is not germane to the issue of patentability of the apparatus itself.

Addressing claim 13, Nozik discloses the photo-reactive surface comprises a light transparent substrate (transparent conductor, 8:49-54) and a photolytic coating (thin film of semiconductor material, 7:67-8:8).

Addressing claim 14, Nozik discloses the titanium oxide layer 33, when photolytically irradiated, converts water to hydrogen ions and electrons (6:30-33) and Nieda further shows that TiO_2 when irradiated also converts water to hydrogen peroxide (Nieda, [0040]).

Addressing claim 39-40, the recited "confined volume" is not claimed as part of the structure of the claimed apparatus, the manner or method in which the apparatus is to be utilized is not germane to the issue of patentability of the apparatus itself.

Addressing claim 43, figure 3 of Nozik shows that the counter electrode 34 is electrically connected to electrical conductor 32.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

11. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nozik (US 4,011,149) in view of Gordon (US 4,650,554).

Addressing claim 15, Nozik is silent regard the photolytic coating further comprising a disproportionation catalyst.

Gordon a photoelectrolytic apparatus for generating oxygen and hydrogen gases from water (1:5-9); wherein, the catalyst for evolving oxygen comprises both TiO_2 and MnO_2 (5:56-62).

At the time of the invention, one with ordinary skill in the art would have found it obvious to modify the catalyst layer of Nozik with the MnO_2 catalyst of Gordon because the catalyst that comprises both TiO_2 and MnO_2 according to Gordon is effective at evolving oxygen (Gordon, 5:56-62).

Response to Arguments

12. Applicant's arguments with respect to claims 1-15, 33 and 39-44 have been considered but are moot in view of the new ground(s) of rejection. Delay citation of references is regretted.

13. It is regretted that the indication of allowable subject matter with respect to claims 16-32 and 35-38 is withdrawn.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to BACH T. DINH whose telephone number is (571)270-5118. The examiner can normally be reached on Monday-Friday EST 7:00 A.M-3:30 P.M.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen can be reached on (571)272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

BD
01/23/2009

/Kaj K Olsen/
Primary Examiner, Art Unit 1795